REMARKS

By this response, claims 49 and 50 have been cancelled without prejudice or disclaimer; claim 20 has been amended to incorporate the features of claim 49; and claim 30 has been amended to depend from claim 20; thereby leaving claims 1-30, 34-40, 48 and 51 pending in the application. The claim amendments do not add new matter and do not raise any new issue that would require further search and/or consideration by the Office. Accordingly, the amendments should be entered. Favorable consideration is respectfully requested.

Rejection Under 35 U.S.C. § 112, ¶1

Claim 49 was rejected under 35 U.S.C. § 112, ¶1, for allegedly failing to comply with the written description requirement. The rejection is respectfully traversed.

The features of cancelled claim 49 have been incorporated into claim 20. The Office asserts that the specification does not "specifically state" that the die compaction takes place without external lubrication. Firstly, there is no legal requirement that the specification must provide a verbatim written description of the subject matter of a claim. *See* M.P.E.P. § 2106(V)(B)(1), page 2100-14. Rather, to comply with the written description requirement, "an applicant's specification must reasonably convey to those skilled in the art that the applicant was in possession of the claimed invention as of the date of the invention" (citation omitted). *Id.*

Secondly, the specification describes the following three alternatives for performing the method: (1) combining iron or iron-based powder with an internal lubricant (page 4, last paragraph); (2) using external lubrication (page 5, first

paragraph); or (3) using a combination of internal and external lubrication (paragraph 5, first paragraph). Accordingly, the specification provides express disclosure that shows Applicants were, in fact, in possession of the claimed subject matter as of the date of the invention and thus supports the recitation in claim 20 that "the compaction is performed without using external lubrication." Original claims 7-9 also provide support for these features. Thus, it is respectfully submitted that the specification provides a written description of the subject matter of claim 20 that complies with the provisions 35 U.S.C. 112, ¶1. Therefore, withdrawal of the rejection is respectfully requested.

Rejections Under 35 U.S.C. § 103

A. Claims 20-30, 34-38, 40, 48 and 49 were rejected under 35 U.S.C. § 103(a) over U.S. Patent No. 6,638,335 to Ozaki et al. ("Ozaki"). Claim 49 has been cancelled. The rejection is respectfully traversed.

Claim 20, as amended, recites a process for preparing high density green compacts comprising (a) subjecting a composition of an iron or iron-based powder, wherein less than about 5% of the powder particles have a size below 45 μm, and a lubricant added to the powder in an amount between about 0.05% and about 0.6% by weight, to uniaxial compaction in a die at a compaction pressure of at least about 800 MPa, without using external lubrication; and (b) ejecting the green body from the die (emphasis added). In the claimed process, the lubricant is added to the powder in an amount between about 0.05 and about 0.6% by weight; less than about 5% of the powder particles have a size below 45 μm; external lubrication is not used; and the compaction pressure is at least about 800 MPa.

The process recited in claim 20 can produce high-density green bodies. Green bodies formed from the compacted "coarse particles," to which an internal lubricant has been added, but external lubrication is not used, are able to be ejected from dies using low ejection forces. The green bodies also have desirable surface finishes.

The claimed process resulted from the inventors' unexpected finding that coarse powders (i.e., powders that contain, at most, a small amount of fine particles) can be compacted to produce green bodies that have high densities and shiny surfaces. For many applications, a high density is needed to provide the specified mechanical properties. Shinny (i.e., not deteriorated) surfaces are needed for industrially used products. However, when a powder is compacted to high density using a high compaction pressure, the ejection force needed to eject the compacted body from the die affects the surface finish of the compacted body. The higher the ejection force, the greater is the risk that a deteriorated compact surface will be obtained.

The specification describes comparative test results that demonstrate unexpected results that can be provided by embodiments of the claimed process. In Example 1 described at pages 6-7 of the specification, two different iron-based powder compositions according to the claimed process were compared with a standard iron-based powder composition. All three compositions were produced with Astaloy Mo. Graphite and a lubricant were added to the compositions. For one of the powder compositions, particles of the Astaloy Mo with a diameter less than 45 microns were removed ("+45 micron powder"). For another powder composition, particles of Astaloy Mo having a size of less than 212 microns were removed ("+212

micron powder"). Fig. 1-1 shows the relationship between green density (GD) and compaction pressure for the three powders. A clear density increase at all compaction pressures was obtained with the +212 micron powder.

Fig. 1-2 shows the relationship between the ejection force (F_e) and compaction pressure. As shown, the ejection force for the compacts produced with the +212 micron powder is considerably lower than the ejection force needed for compacts produced from the standard iron-based powder composition including about 20% of the particles sized less than 45 microns. Moreover, the ejection force decreases with increasing compaction pressure, which is opposite to the relationship for the standard composition. The ejection force needed for compacts produced from the +45 micron powder is also lower than that of the standard powder.

The compacts produced by compacting the standard powder at a pressure above 800 MPa also have deteriorated surfaces. In contrast, the compacts obtained when the +45 micron powder is compacted at a pressure above 800 MPa have a more desirable surface. The test results demonstrate that components without deteriorated surfaces can be obtained by reducing particles smaller than 45 microns.

Example 2 is described at page 7 of the specification. As shown in Figs. 2-1 and 2-2, respectively, higher green densities and lower ejection forces are obtained using the +45 micron powder than with the powder composition containing the standard powder. Also, components produced from the standard powder have deteriorated surfaces at all compaction pressures.

Ozaki discloses iron powders especially for manufacturing electric and mechanical parts that require high magnetism and/or high mechanical strength (column 1, lines 7-10). The Office states that Ozaki discloses the addition of zinc

stearate (an internal lubricant) to the powder. The Office acknowledges that Ozaki does not disclose or suggest performing compaction without using external lubrication. However, the Office contends that it would have been obvious to use compaction without external lubrication "in order to save processing steps." Ozaki does not support the rejection of claim 20 for at least the following reasons.

Ozaki discloses a group of green compacts A1 to A18 in Table 1 at columns 5-8. Those compacts were formed using the compaction conditions A, B and C shown in Table 2, at columns 7 and 8. Powders A1-A10, A16 and A17 contained less than 5% of particles having a size of less than 150 μm. Condition A used only internal lubrication and a compaction pressure of 490 MPa; condition B used only external lubrication and a compaction pressure of 490 MPa; and condition C used only external lubrication and a compaction pressure of 1177 MPa. In Example 2 at columns 15 to 17 of Ozaki, iron powders were compacted at a compaction pressure of 1,177 MPa, again using only external lubrication. Ozaki does not suggest using a compaction pressure of at least about 800 MPa without using external lubrication. In contrast, Ozaki discloses using a compaction pressure of at least about 800 MPa when only external lubrication is used.

Ozaki produced green compacts with the highest density using condition C with no internal lubrication. See Tables 1 and 3 at columns 11-12 of Ozaki. According to Ozaki's test results, external lubrication, without internal lubrication, in combination with a high compaction pressure (1177 MPa) are necessary to obtain high green densities. This disclosure in Ozaki would have led one having ordinary skill in the art away from the process of claim 20, which does not use external lubrication.

Moreover, "the mere fact that the prior art could be so modified would not have made the modification obvious unless the prior art suggested the desirability of the modification" (emphasis added). *In re Gordon*, 221 U.S.P.Q. 1125, 1127 (Fed. Cir. 1984). However, Ozaki does not suggest the desirability of using internal lubrication, no external lubrication, and a compaction pressure of at least about 800 MPa, as recited in claim 20. Ozaki does not suggest using both internal lubrication and external lubrication. As such, Ozaki does not suggest not using external lubrication instead of using a combination of internal and external lubrication to "save processing steps, "as suggested in the Office Action". "Obvious to try" is not the proper standard for obviousness. *See, e.g., Dow Chemical Co. v. American Cyanamid Co.*, 5 U.S.P.Q.2d 1529, 1532 (Fed. Cir. 1988).

For at least the foregoing reasons, the process of claim 20 is patentable. Claims 21-30, 34-38, 40 and 48, which depend from claim 20, are also patentable for at least the same reasons as those for which claim 20 is patentable. Therefore, withdrawal of the rejection is respectfully requested.

B. Claims 39, 50 and 51 were rejected under 35 U.S.C. § 103(a) over Ozaki in view of U.S. Patent No. 5,134,881 to Rutz et al. ("Rutz"). Claim 50 has been cancelled. The rejection is respectfully traversed.

Claims 39 and 51 depend from claim 20. Applicants submit that Rutz fails to cure the above-described deficiencies of Ozaki with respect to the process recited in claim 20. Rutz discloses a method of making a sintered metal component. As was discussed in the Amendment filed on April 10, 2006, Rutz discloses using powders containing more than 20% of particles smaller than 45 μm. In Rutz, the compaction

is performed at elevated temperatures and comparatively high compaction pressures are used. The Office has established no suggestion or motivation to use Rutz's powders at a compaction pressure of at least about 800 MPa. Rutz does not disclose the compacts have any particular surface finish.

Applicants submit that Rutz does not suggest modifying Ozaki's process to produce the claimed process, which uses a coarse iron or iron-based powder, an internal lubricant, no external lubrication, and uniaxial compaction at a pressure of at least about 800 MPa. The claimed process unexpectedly can produce compacts that have a desirable surface finish. The applied references also fail to recognize these advantageous effects. Therefore, withdrawal of the rejection is respectfully requested.

Conclusion

For the foregoing reasons, allowance of the application is respectfully requested. Should there be any questions concerning this response, the Examiner is respectfully requested to contact the undersigned at the number given below.

Respectfully submitted,

BUCHANAN INGERSOLL & ROONEY PC

Date: February 20, 2007 By: _____

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